APPENDIX A

Interim Viability Criteria Overview of Threatened Willamette/Lower Columbia Pacific Salmonids

The information in this appendix comes from *Interim Report on Viability Criteria for Willamette and Lower Columbia Basin Pacific Salmonids*, which was prepared by the Willamette/Lower Columbia Technical Recovery Team in March 2003.

Adult Population Productivity and Abundance Criteria Guidelines

1. In general, viable populations should demonstrate a combination of population growth rate, productivity, and abundance that produces an acceptable probability of population persistence. Various approaches for evaluating population productivity and abundance combinations may be acceptable, but must meet reasonable standards of statistical rigor.

2. A population with a non-negative growth rate and an average abundance approximately equivalent to estimated historical average abundance should be considered to be in the highest persistence category. The estimate of historical abundance should be credible, the estimate of current abundance should be averaged over several generations, and the growth rate should be estimated with an adequate level of statistical confidence. This criterion takes precedence over criterion 1.

Juvenile Outmigrant Production Criteria Guidelines

1. The abundance of naturally produced juvenile outmigrants should be stable or increasing as measured by observing a median annual growth rate or trend with an acceptable level of confidence.

Within-Population Diversity Criteria Guidelines

1. Sufficient life-history diversity must exist to sustain a population through short-term environmental perturbations and to provide for long-term evolutionary processes. The metrics and benchmarks for evaluating the diversity of a population should be evaluated over multiple generations and should include:

    a. A substantial proportion of the diversity of a life-history trait(s) that existed historically

    b. Gene flow and genetic diversity should be similar to historical (natural) levels and origins

    c. Successful utilization of habitats throughout the range

    d. Resilience and adaptation to environmental fluctuations

Habitat Criteria Guidelines

1. **The spatial distribution and productive capacity** of freshwater, estuarine, and marine habitats should be sufficient to maintain viable populations identified for recovery.

2. **The diversity of habitats** for recovered populations should resemble historical conditions given expected natural disturbance regimes (e.g., wildfire, flood, volcanic eruptions, etc.). Historical conditions represent a reasonable template for a viable population; the closer the habitat resembles the historical diversity, the greater the confidence in its ability to support viable populations.

3. **At a large scale, habitats should be protected and restored, with a trend toward an appropriate range of attributes for salmonid viability.** Freshwater, estuarine, and marine habitat attributes should be maintained in a non deteriorating state.

Within-Population Spatial Structure Criteria Guidelines

1. The spatial structure of a population must support the population at the desired productivity, abundance, and diversity levels through short-term environmental perturbations, longer-term environmental oscillations, and natural patterns of disturbance regimes. The metrics and benchmarks for evaluating the adequacy of a population's spatial structure should specifically address:

    a. Quantity: Spatial structure should be large enough to support growth and abundance, and diversity criteria.

    b. Quality: Habitat underlying spatial structure should be within specified habitat quality limits for life-history activities (spawning, rearing, migration, or a combination) taking place within the patches.

    c. Connectivity: Spatial structure should have permanent or appropriate seasonal connectivity to allow adequate migration between spawning, rearing, and migration patches.

    d. Dynamics: The spatial structure should not deteriorate in its ability to support the population. The processes creating spatial structure are dynamic, so structure will be created and destroyed, but the rate of loss should not exceed the rate of creation over time.

    e. Catastrophic Risk: The spatial structure should be geographically distributed in such a way as to minimize the probability of a significant portion of the structure being lost due to a single fish catastrophic event, either anthropogenic or natural.

Appendix B: Draft Bull Trout Recovery Criteria

Bull Trout—Willamette Basin Wide Goals

USFWS Recovery Goals and Objectives:

The goal of the bull trout recovery plan is to ensure the long-term persistence of self-sustaining, complex, interacting groups of bull trout distributed throughout the species native range so that the species can be delisted. To achieve this goal the following objectives and been identified for bull trout in the Willamette Recovery unit:

- Maintain current distribution of bull trout and restore distribution in previously occupied areas within the Willamette Recovery unit
- Maintain stable or increasing trends in abundance adult bull trout
- Restore in maintain suitable habitat conditions for all bull trout life history stages and forms
- Conserve genetic diversity and provide opportunity for genetic exchange

Agency	Adult Productivity and Abundance	Population Diversity	Habitat	Within Population Spatial Structure
ODFW	At least 5 local populations with at least 1000 adults in each population with stable or increasing trends for not less than 10 years	Populations in core areas of Willamette Recovery Unit (McKenzie/;Middle Fork, Clackamas)		
USFWS	900 to 1500 or more individuals in the recovery unit, distributed in each core area as follows: 600 to 1000 in the upper Willamette River core area and 300 to 500 in the Clackamas River core habitat with stable or increasing trends for minimum of 10 years	Distribution criteria will be met when Bull trout are distributed among five or more local populations in the recovery unit: four in the Upper Willamette core area and one in the Clackamas River core habitat. In a recovered condition, the Upper Willamette core area would include local populations in the mainstem McKenzie River (connectivity with the Trail Bridge local population would need to be established), South Fork McKenzie River, upper Middle Fork Willamette River, and Salt Creek/Salmon Creek/North Fork Middle Fork Willamette River complex.	The construction of impassable dams and culverts is considered a major factor in the decline of bull trout, blocking migratory corridors and altering temperature and flow régimes. Habitat degradation, passage barriers, over harvest, chemical treatment projects, and hybridization and competition with non-native brook trout are possible suppressing factors for bull trout populations in the Willamette River Basin. Alteration and degradation of in stream habitat resulting in loss of in stream structure, pools, and side channel habitats are identified as limiting bull trout populations in the McKenzie and Middle Fork Willamette River basins. Causal mechanisms can be both man-made in natural and are difficult to quantify due to lack of data on historic population abundance and habitat condition.	Connectivity criteria will be met when migratory forms are present in all local populations and with intact migratory corridors among all local populations in core areas provide opportunity for genetic exchange and diversity. For the upper Willamette River core area, meeting connectivity criteria would require in establishing fish passage at Cougar, Trail Bridge, Dexter, Lookout, and Hills Creek dams. In the future, establishing fish passage at dams in the Clackamas and Santiam River Basin may be necessary, but currently there is insufficient information to make that determination.

Appendix C: Oregon Chub Recovery Criteria

Oregon Chub—Willamette Basin Wide Goals

USFWS:

The ultimate object of the U.S. Fish and Wildlife Service is to delist Oregon chub.

Current known or suspected threats to existing populations of Oregon chub include:

- Nonnative fish
- Threat of nonnative fish introduction
- Bullfrogs present
- Possible agricultural chemical runoff
- Possible logging/siltation and the watershed
- Other water quality issues, including threat of spills
- Low summer water levels
- Spillway operations

Populations of Oregon chub should be monitored and adaptively managed to ameliorate threats. Removal of threats and enhancement activities at occupied sites include:

- Prevent or minimize biotic threats by preventing introduction of non-native fish and amphibians that may act as predators or competitors, removing non-native species (if practical), and isolating Oregon chub populations from introduced fish pathogens.
- Enhance conditions and maintain optimal physical parameters of Oregon chub habitats by preventing inappropriate water diversions, fill or removal of material, water temperature change, excessive sedimentation or removal of cover.
- Prevent chemical impacts by prohibiting use of pesticides and herbicides and reducing the risk of accidental spills of toxicants near Oregon chub populations.
- Identify suitable stream reaches within each subbasin and where possible, restore floodplain habitats within the natural dispersal range of existing Oregon chub populations. The should result in increased abundance of populations limited by lack of suitable habitat.

Agency	Adult Productivity and Abundance	Population Diversity	Habitat	Within Population Spatial Structure
ODFW	20 populations, with at least 500 adults in each population with a stable or increasing trend for 7 years.	At least 4 populations must be located in each of the three subbasins (Willamette River mainstem, Middle Fork Willamette River, Santiam River)		
USFWS	20 populations, with at least 500 adults in each population with a stable or increasing trend for 7 years.	At least 4 populations must be located in each of the three subbasins (Willamette River mainstem, Middle Fork Willamette River, Santiam River)		